

2002-04 ENGINE COOLING

Specifications & Drive Belt Routing - 1.9L TDI (ALH Engine Code)

ENGINE IDENTIFICATION

Engine identification code is stamped between diesel injection pump and exhaust manifold, on cylinder block. See **Fig. 1** . In addition, engine code and serial number are on a sticker on timing belt cover. Also engine code is listed on vehicle data plate.

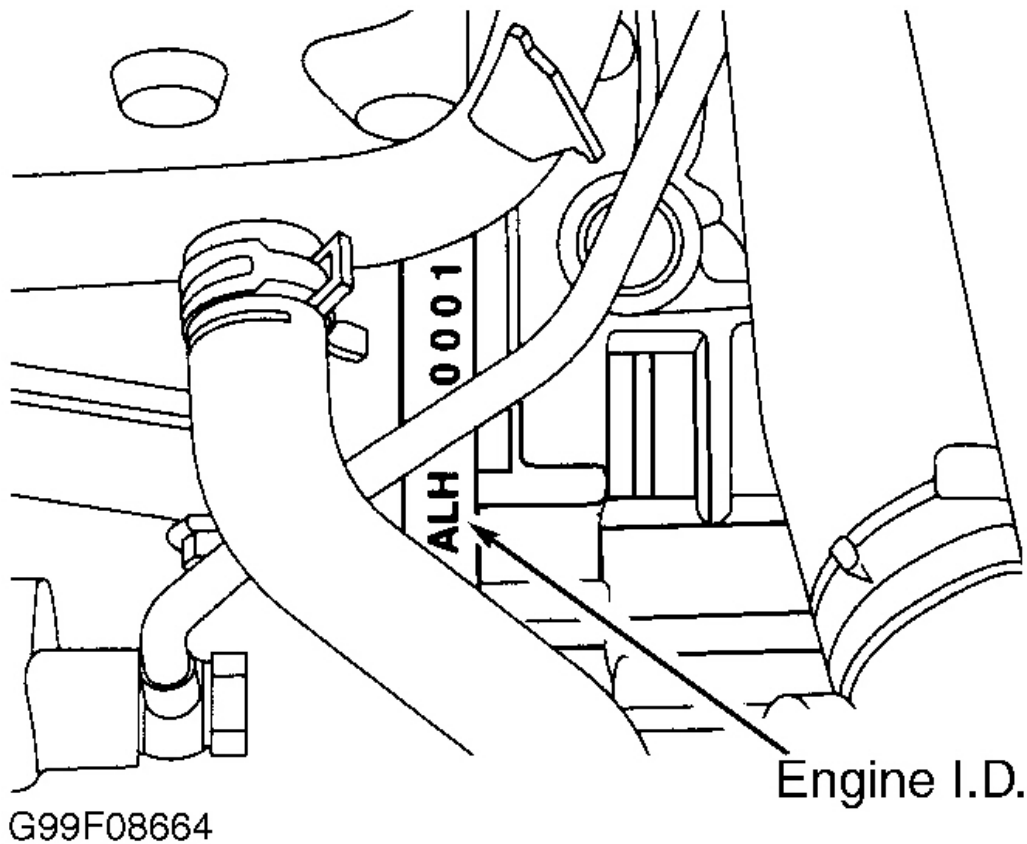
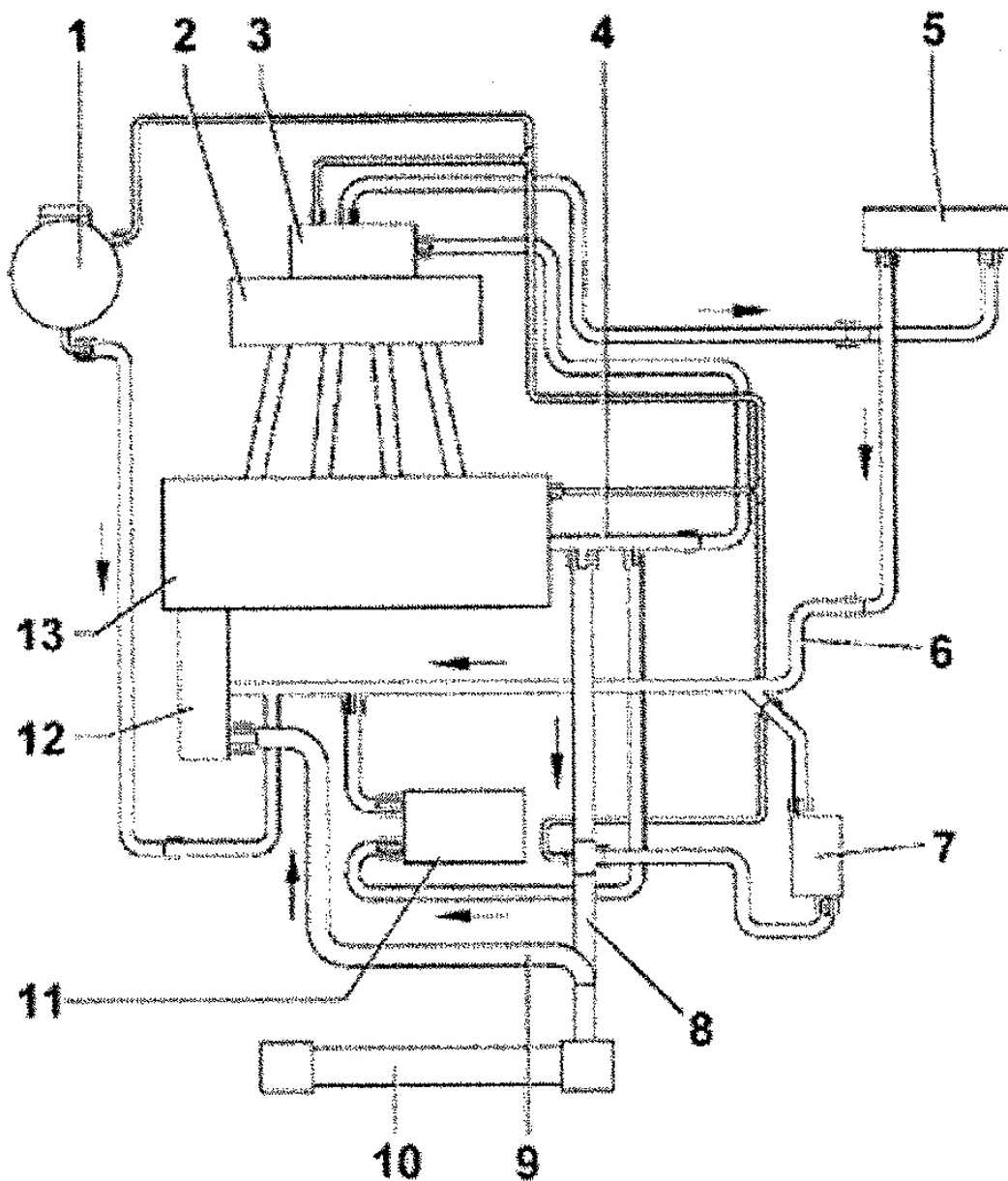


Fig. 1: Locating Engine Identification Code (1.9L TDI, ALH)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

COMPONENT LOCATIONS

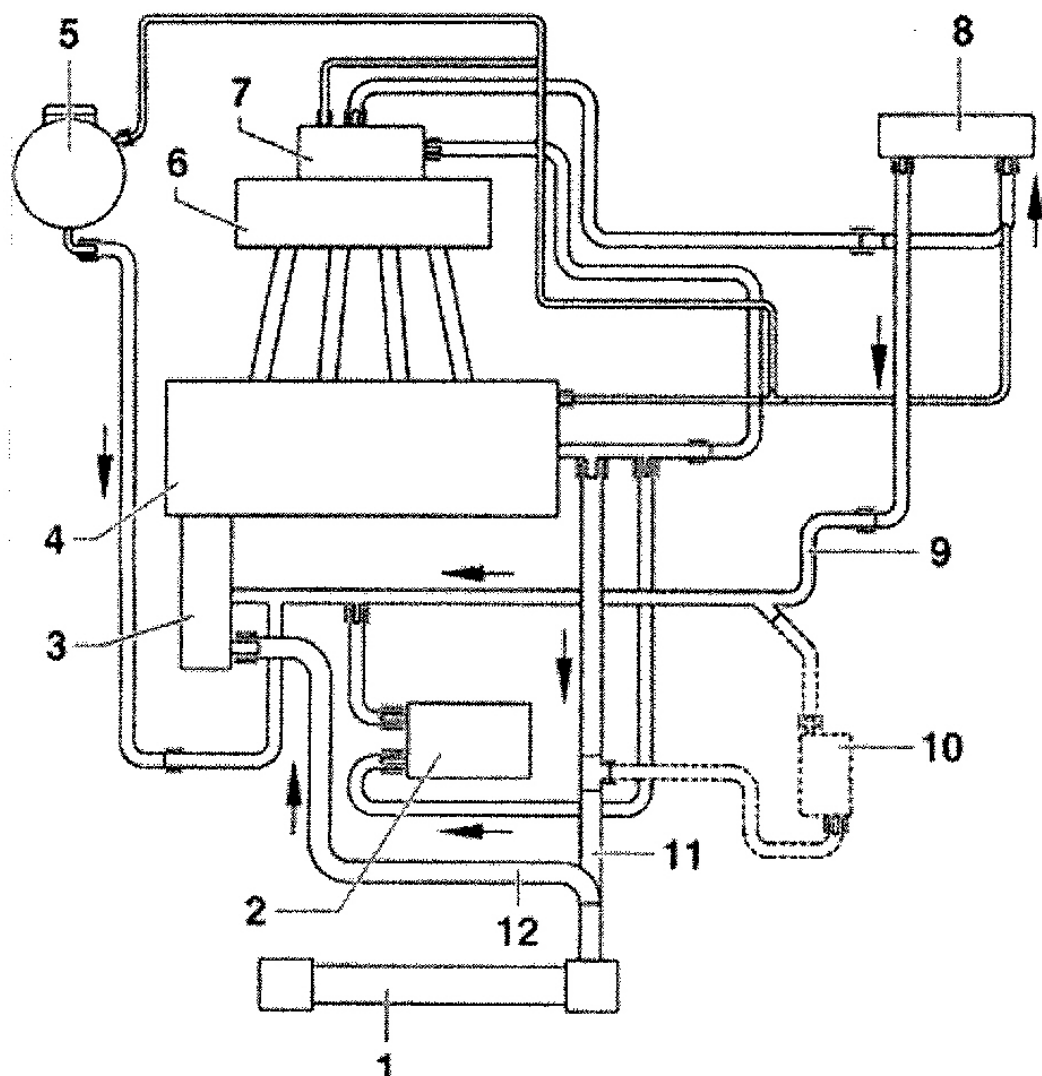
COOLING SYSTEM IDENTIFICATION

NOTE: Three letter code indicates engine identification code. For location of engine code, see ENGINE IDENTIFICATION .



- | | |
|---|----------------------------------|
| 1. Expansion Tank | 8. Upper Radiator Hose |
| 2. Intake Manifold | 9. Lower Radiator Hose |
| 3. EGR Cooler | 10. Radiator |
| 4. Connector | 11. Oil Cooler |
| 5. Heater Core | 12. Water Pump/Thermostat |
| 6. Coolant Center Line | 13. Cylinder Head/Cylinder Block |
| 7. ATF Cooler (Automatic Transmission Only) | |

Fig. 2: Identifying Cooling System Component & Coolant Flow (1.9L TDI, Golf & Jetta)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



- | | |
|--------------------|-------------------------------|
| 1. Radiator | 8. Heat Exchanger |
| 2. Oil Cooler | 9. Coolant Pipe |
| 3. Water Pump | 10. Transmission Cooler |
| 4. Engine Block | (Automatic Transmission Only) |
| 5. Expansion Tank | 11. Upper Radiator Hose |
| 6. Intake Manifold | 12. Lower Radiator Hose |
| 7. EGR Cooler | |

Fig. 3: Identifying Cooling System Components & Coolant Flow (1.9L TDI, Beetle)

Courtesy of VOLKSWAGEN UNITED STATES, INC.

DRAINING, FILLING & BLEEDING

COOLING SYSTEM PRECAUTIONS

Use only coolant additive G12 meeting specification VW 774 D. G12 coolant is Red in color. G12 must not be mixed with any other additives. If fluid in expansion tank is Brown, this is an indication that G12 has been mixed with another type of coolant. In this case, coolant must be changed.

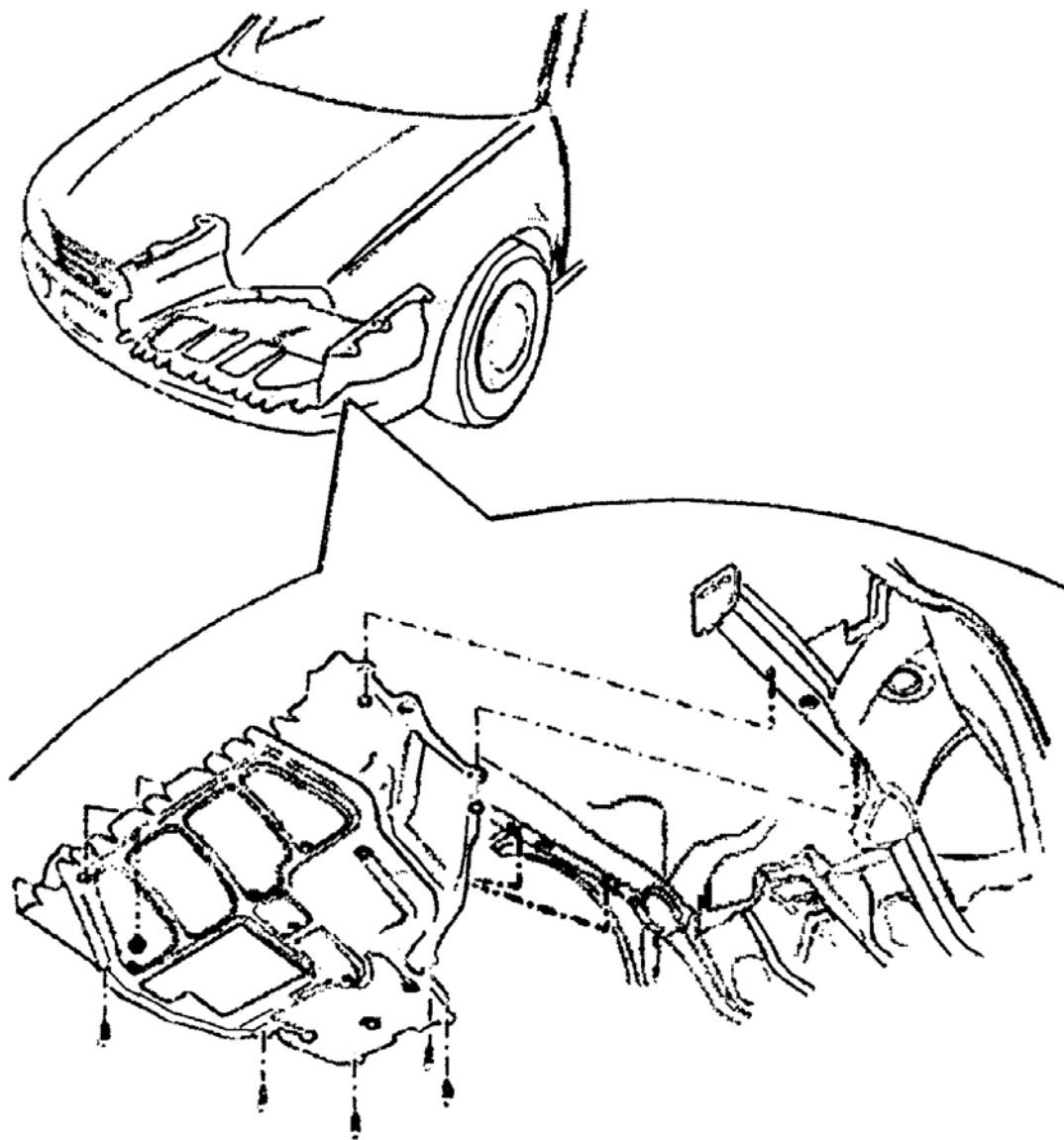
G12 coolant additive may be used in older vehicles when original coolant is drained and cooling system is flushed. Contaminated coolant must be drained immediately and cooling system flushed. See **SERVICING** . Also, if radiator, heat exchanger (heater core), cylinder head or cylinder head gasket, have been replaced, flush cooling system and replace engine coolant.

DRAINING, FILLING & BLEEDING COOLING SYSTEM

WARNING: Cooling system is pressurized, when engine is at operating temperature. Use caution and use other appropriate protective gear (safety glasses and gloves) when servicing cooling system. Slowly and carefully release system pressure, before performing any repairs.

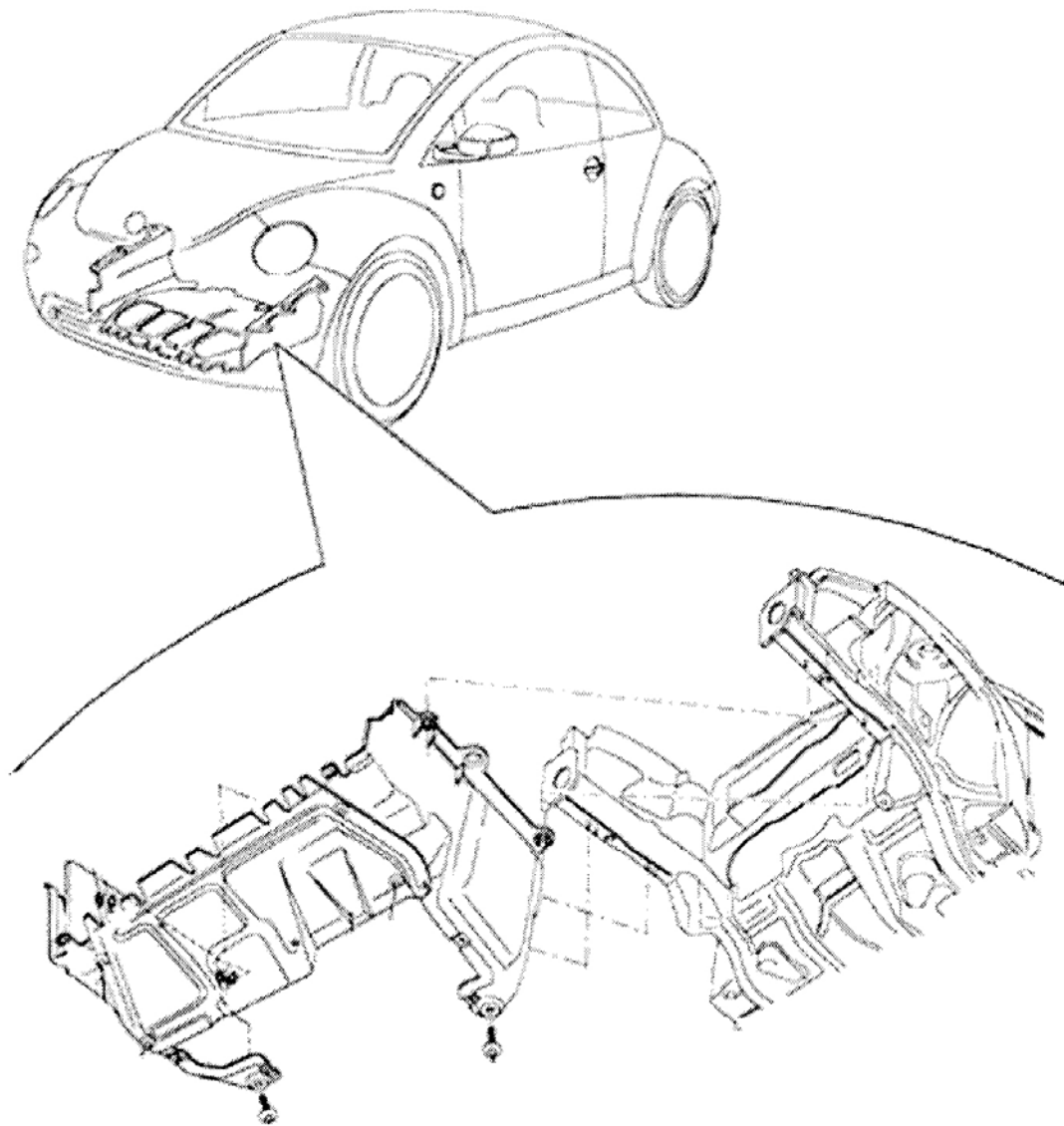
1.9L TDI (Engine Code ALH)

1. Turn engine off, and allow to cool. Remove engine cover. Open cap on coolant expansion tank. Raise and support vehicle. Remove noise insulation panel from below engine compartment. See **Fig. 4** or **Fig. 5** . Place appropriate drain pan underneath vehicle.



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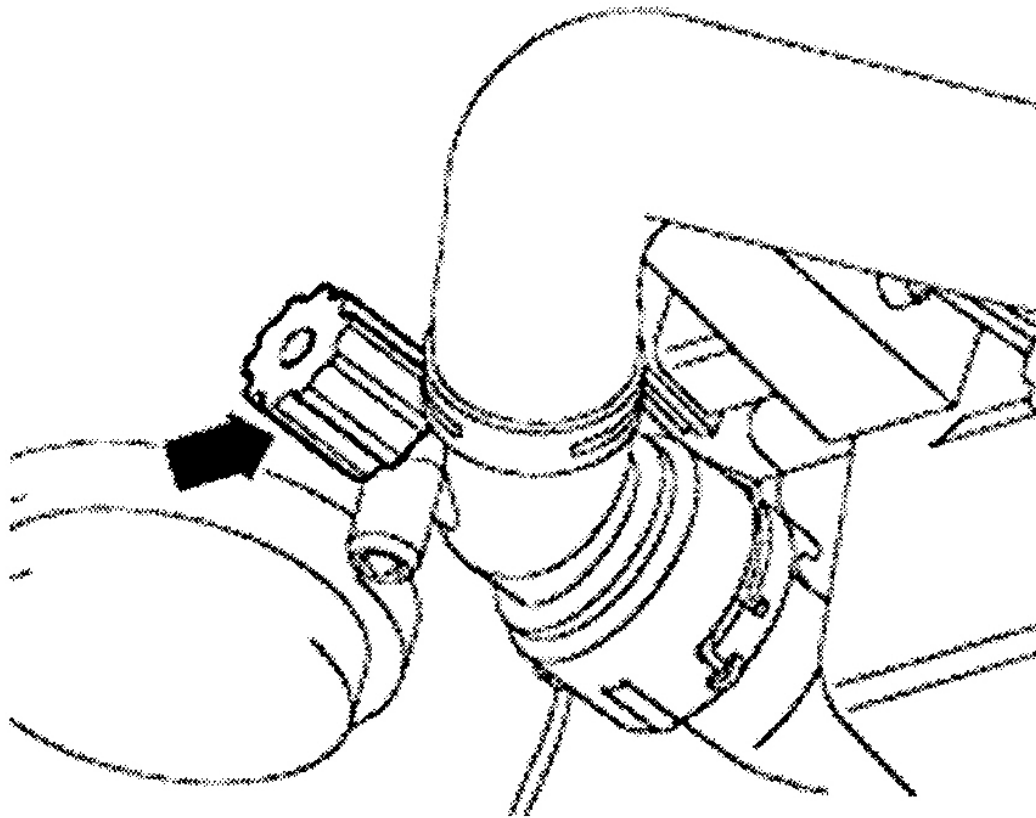
Fig. 4: Identifying Noise Insulation Mounting Points (Golf & Jetta)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



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Fig. 5: Identifying Noise Insulation Mounting Points (Beetle)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

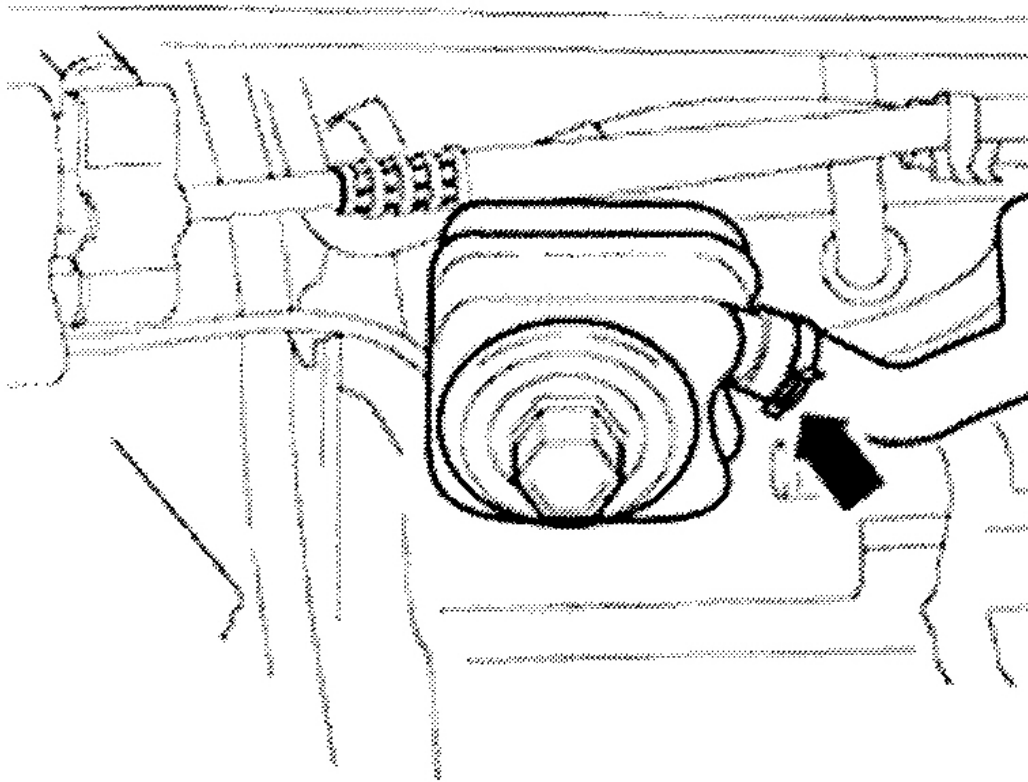
2. Unscrew drain plug (arrow), and drain coolant from radiator. See **Fig. 6** .



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Fig. 6: Identifying Drain Screw On Radiator
Courtesy of AUDI OF AMERICA, INC.

3. Remove coolant hose from oil cooler, and drain coolant from engine. See **Fig. 7** .



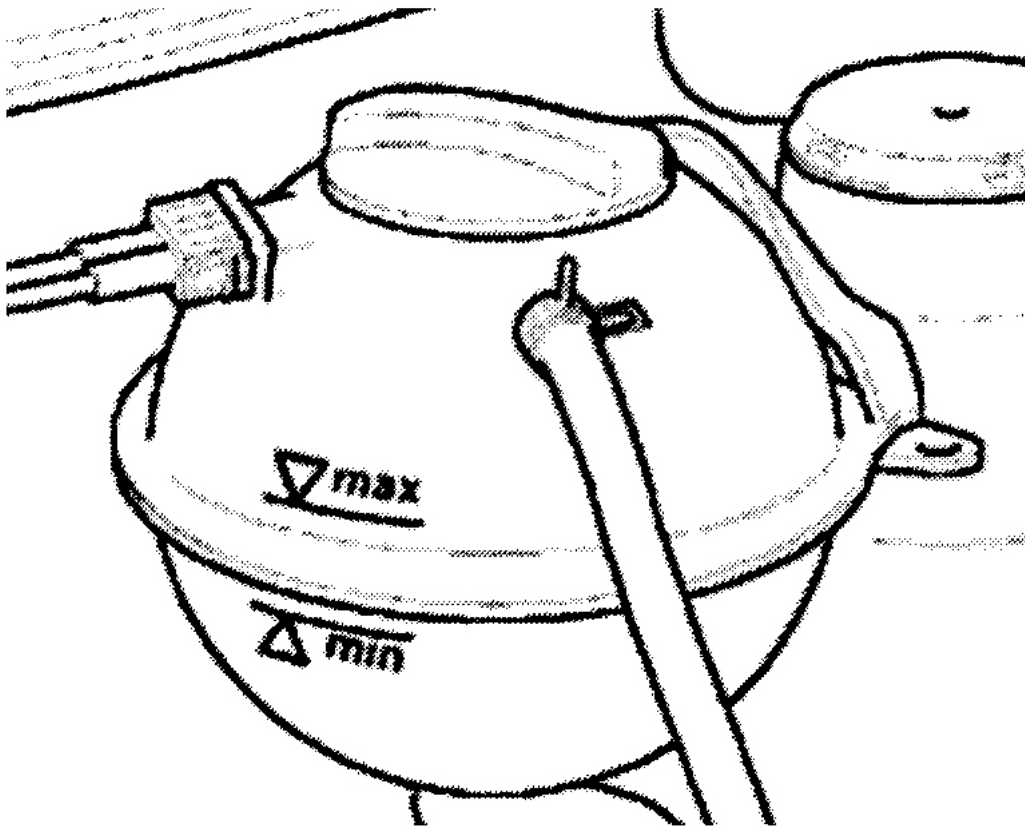
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Fig. 7: Locating Oil Cooler Hoses

Courtesy of VOLKSWAGEN UNITED STATES, INC.

CAUTION: DO NOT mix Green and Red coolant. Mixing these two coolant types will cause severe engine damage. Use ONLY G 012 A8 D Red coolant. See COOLING SYSTEM SPECIFICATIONS .

4. Close drain plug at radiator. Fill cooling system with recommended coolant mixture. See COOLING SYSTEM SPECIFICATIONS . Fill expansion tank with coolant to MAX mark. Install expansion tank cap.
5. Start engine, and let idle until coolant fan turns on. Check coolant level, and top off as necessary.
6. When engine is at normal operating temperature, coolant level must be on MAX mark, on expansion tank. See **Fig. 8** . When engine is cold, coolant level must be between MIN and MAX marks, on expansion tank.



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Fig. 8: Identifying Expansion Tank Markings
Courtesy of VOLKSWAGEN UNITED STATES, INC.

SERVICING

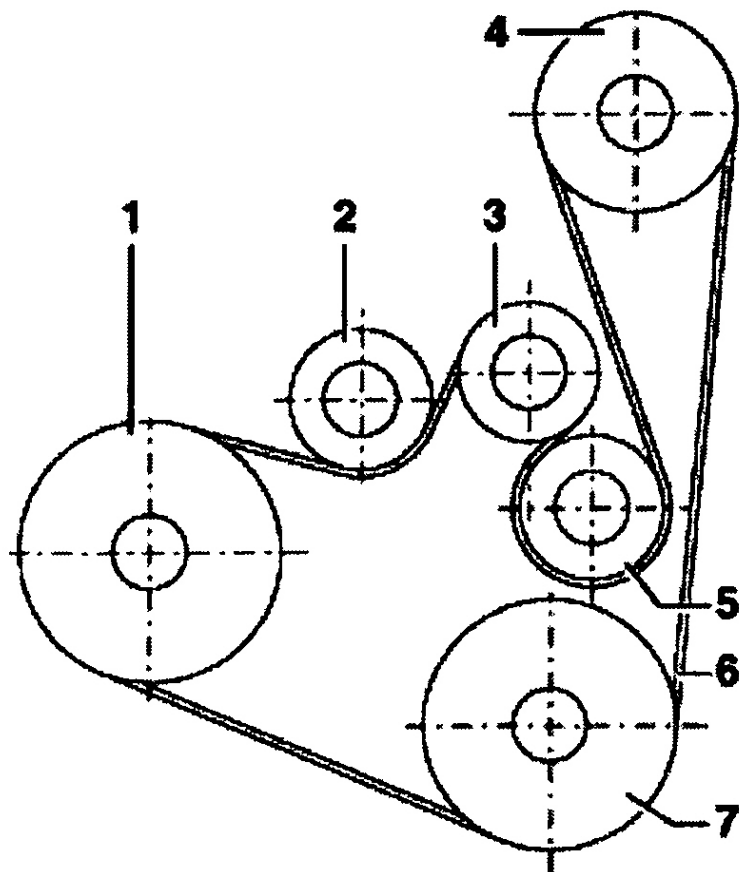
Coolant does not usually need replacing. In cases of larger repairs when coolant needs to be drained, new coolant must be used because old coolant has been exposed to oxidation and dirt. Flush cooling system when replacing coolant. To flush, fill system with clear water, and run engine for approximately 2 minutes. Flushing system should remove most coolant residue. Fill with a mix of clean water and manufacturer recommended coolant. See **COOLING SYSTEM SPECIFICATIONS** .

Coolant to water ratio must not exceed 60%. Frost protection and cooling efficiency will decrease if the percentage of coolant is too high. For coolant to water ratio, see **COOLANT MIXTURE RECOMMENDATIONS** table under COOLING SYSTEM SPECIFICATIONS.

ADJUSTMENTS

Prior to removing drive belt, mark direction of rotation. Serpentine belt is self-adjusting. For proper belt routing, see **DRIVE BELT ROUTING** .

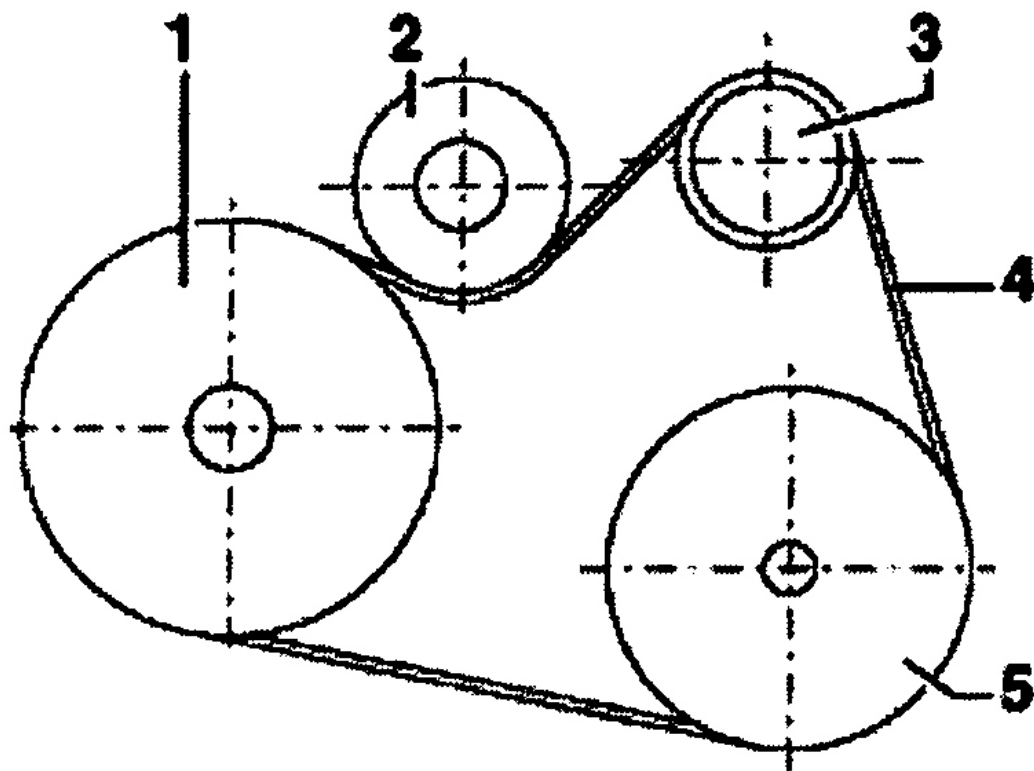
DRIVE BELT ROUTING



- 1- Vibration damper/pulley
- 2- Tensioner
- 3- Pulley-generator
- 4- Pulley-power steering pump
- 5- Idler pulley
- 6- Ribbed belt
- 7- Pulley-A/C compressor

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Fig. 9: Drive Belt Routing (With A/C)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Vibration damper/pulley

2- Tensioner

3- Pulley-generator

4- Ribbed belt

5- Pulley-power steering pump

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Fig. 10: Drive Belt Routing (Without A/C)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

COOLANT MIXTURE RECOMMENDATIONS

Application	Specification
Freezing Point	
Down To -13° F (- 25° C)	40% Coolant
Down To -31° F (- 35° C)	50% Coolant

COOLING SYSTEM SPECIFICATIONS

Application	Specification
Coolant Capacity	(1) 6.3 Qts. (6.0L)
Coolant Replacement Interval	(2)
Recommended Coolant	(3) G 012 A8 D
Thermostat	
Start To Open	185° F (85° C)
Fully Open	221° F (105° C)
Opening Lift	7 mm
(1) Total coolant quantity may vary depending on vehicle equipment.	
(2) Manufacturer does not require routine coolant replacement. Replace coolant only if major repair is necessary.	
(3) G12 coolant is Red in color. DO NOT mix Green and Red coolant. Mixing these two coolant types will cause severe engine damage.	